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STUDY OF TUBERCULOUS CERVICAL LYMPHADENOPATHY

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CERTIFICATE

This is to certify that the dissertation entitled **"Study of Tuberculous Cervical Lymphadenopathy"** is a bonafide record of work done by **Dr. M. Gnaanasekar,** in the Department of Surgery, Government Rajaji Hospital, Madurai Medical College, Madurai.

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INTRODUCTION

Neck consists of 300 lymph nodes nearly 1/3 of total lymph nodes of the body. The enlargement of these nodes is significant because of many etiologic factors.

Any infection of the upper respiratory tract can be associated with cervical adenitis. In adolescents infections Mononucleosis may begin with diffuse adenopathy.

Chronic granulomatous diseases, particularly cervical lymph node tuberculosis, are endemic in various parts of the world. Sarcoidosis often affects mediastinal and tracheal lymph nodes but cervical adenopathy is also common.

Histroplasmosis, Coccidoidomycosis and Actionmycosis can also produce cervical lymphadenopathy.

Salivary gland infections can also produce cervical lymphadenopathy, so also any infection in the oral cavity, ear nose, throat and scalp can also produce cervical lymphadeopathy.

Massive lymphadenopathy in young adults and children is seen in Reactive lymphoid lymphoplasia.

Malignant metastasis can also be the cause of cervical lymph node enlargement. Lymphomas also present as cervical lymphadenopathy

Among the different infective and inflammatory conditions of cercical lymphadenopathy Tunerculosis is the most commonly found because of the high prevalence of the disease in our country.

Cervical lymph node involvement is one of the common extra-pulmonary manifestations of tuberculosis. It is commonly encountered in daily surgical out patient departments in our country.

Tuberculosis is a disease of great antiquity and has even been found in Egyptian mummies. It is remains a major disease on a worldwide basis. Fortunately by effective host defence mechanisms and small number of infecting bacilli most people overcome the primary infection. Better nutrition and improved social conditions have brought down the disease to low levels in developed countries. It is still common in developing countries like India. Estimates suggest that worldwide 10 million people develop tuberculosis annually. The risk is greatly increased in immunocompromised patients.

Tuberculous lymphadenopathy commonly adolescents and young adults. Children are also affected. Common age of affected children is 0-5 years. Neck lymph nodes are the commonly affected.

Mycobacterium bovis was considered to be the cause of tuberculous lymphadenopathy in the past. But now mycobacterium tunerculosis is shown to be responsible for most of the tuberculous lymphadenopathy and mycobacterium bovis in a few cases.

This study comprises of 50 cases of cervical lymphadenopathy taken from Government Rajaji Hospital, Madurai during the period Mach 2002 to March.2005.

This study was done to know the incidence and etiological factors of cervical lymphadenopathy; the distribution according to age, sex, urban –rural population, socioeconomic conditions of patients.

This study is mainly on inflammatory and infective causes of cervical lymphadenopathy. Other causes of cervical lymphadenopathy are excluded form the study.

HISTORICAL REVIEW

The lymphatic system was first described Erasistratus in Alexandria more than 2000 years ago.

The development of lymphatic system from class Pisces to class Mammalia has grown in complexity. Inspite of tremendous knowledge explosion occurring all over the world there remains much to be understood about the structure and functions of the lymphatic system.

After understanding the anatomy of blood vessels and circulation, medical men started to learn about lymphatic vessels. Herophilos 300 B.C. of Alexandria described the lymphatic vessels. In 1062 Gasparo Asselli, Professor of surgery in Milan, described the lymphatic vessels in the mesentery of the dog.

Galen postulated that these vessels enter the liver and empty their contents into blood vessels. Kean in 1651, in France described the recepticulum chili and the thoracic duct. Thomas Bartholin coined the term “lymphatics” in 1653.

William Hunter in 1718 said that the lymphatic vessels are the absorbing vessels all over the body.

Malphigi (1661) described in detail the structure of blood capillaries. William Hawson made extensive dissections of the lymphatic system in fishes and mammals. He found that in fishes lymphatic glands were absent, but well developed in man. Karl Ludwig (1816) pioneered the study of lymphatic system by collecting lymph from the lymphatic vessels in different parts of the body. Lumberg thought that lymph was a filtrate derived from blood. Ernest Starling (1866-1927) point out the fundamental relationship of plasma proteins and proteins and colloidal osmotic pressure of blood. An account of structure of lymph node and lymphatic vessels appeared in Watson's Ademographica (Leipiz, 1861 & 1863). Toldt was the first to advocate the name lymph node. In 1955, at the "Naminia Anatomica" of Paris all adopted the term.

TUBERCULOUS LYMPHADENOPATHY: Tuberculous lesions have been found in vertebrae of Neolithic man in Europe and Egyptian mummies perhaps as early as 3700 B.C

Dele Boe Sylvius. (1614-22) had discovered tuberculosis after studying postmortem specimens. Tuberculosis was so named because it produces tubercles. Sylvius described tuberculosis as many small glands enlarging and producing large caseating glandular masses in lymph nodes of neck. Scrofula is the old name for tuberculous cervical lymphadenopathy.(Scrofula in Latin means 'sow') Neck of the affected patients resembled neck of swine and hence the name.

Laennac was the first to consider chronic cervical lymphadenopathy as the later development of initial tubercular infection.

In 1865 Williams demonstrated that materials from the diseased tissue produced tuberculosis in animals.

In 1867 J.A.Villemin injected tuberculous material into rabbit and demonstrated nodules in lymphatic system.

1868-Langhans described characteristic giant cells of tubercle.

1880-Weigert described coagulation coagulation necrosis and its relation to caseation

1882-Robert Koch identified the organism Mycobacterium tuberculosis.

1894-Bald Smith separated and studied human and bovine strains of tubercle bacilli.

Albert established that the tubercular origin of the lymph node enlargement and advised hygienic surroundings, good food, fresh air, and sunshine.

In 1954 Walksman discovered streptomycin and its use in tuberculosis treatment has revolutionsed the management of tuberculosis. Various new drugs are introduced since then and along with corticosteroids are used in the treatment of cervical lymphadenopathy.

EMBRYOLOGY OF LYMPHATIC SYSTEM

There are two views regarding the initial stages in the development of the lymphatic system. According to Hunington Chere and Butler lymphatic spaces commence as clefts in the mesenchyme and their lining cells take on the character of endothelium. These spaces form capillary plexuses from which certain lymph sacs are derived.

Another view (Sabin) is that the earliest lymph vessels arise as capillary offshoots from the endothelium of veins as capillary plexuses loose their connection with the venous system and form lymph sacs.

In the human embryo the lymph sacs are 6 in number from which the lymphatic vessels are derived.

Two paired –Jugular and posterior lymph sacs

Two unpaired- Retroperitioneal lymph sacs and the cisterna chili

All the lymphatic sacs except the cisterna chili at a later stage are divided by a number of slender connective tissue bridges. Later they are invaded by lymphocytes and transformed into groups of lymph nodes, the lymph sinuses representing portions of the original cavity of the sac.

ANATOMY OF LYMPHATIC SYSTEM

The lymphatic system is composed of lymphatic capillaries that collect interstitiual fluid, transporting vessels and lymph nodes. Lymphatic capillaries are the site fo interstitial fluid absorption throughout the body. These empty into the transporting vessels that traverse the extremities and body cavities to eventually empty into the venous system via the thoracic ducts. Lymph nodes periodically interrupt these transporting vessels. In the lymph nodes the lymph is filtered and lymph nodes serve a primary immunologic function.

Lymph capillaries are similar to blood capillaries but the basement membrane is much less distinct. Large gaps exist between adjacent lymphatic endothelial cells that allow particles as large as bacteria, red blood cells and even lymphocytes to pass through the vessel walls. The capillaries are without valves and they communicate directly with collecting vessels at the dermal subcutaneous junction. The superficial lymphatic channels of the extremities consist of several valved channels that pass primarily on the medial aspect of he limb toward the groin or axilla where they end in one or more lymph nodes. Three is a separate deep lymphatic system that runs deep to the muscular fascia coursing along the neurovascular bundles.

Lymph vessels have a well-defined adventitia, the tunica media with smooth muscle cells and the thin intima. Interposed throughout the course of the collecting lymphatic channels are lymph nodes. Typically, a lymph node

has several afferent channels that enter the capsule and lymph drains into sinuses that bathe the cortical and medullary areas of the lymph node. The lymph then exits by a single efferent channel. The cortical areas of the lymph node. The lymph then exits by a single efferent channel. The cortical areas of the lymph node contain predominantly lymphocytes that are arranged in follicles separated by extensions of the capsule. Within the follicles are discrete germinal centers. The medulla may contain macrophages and plasma cells as well as lymphocytes, and these cells are believed to be in dynamic equilibrium within the lymph node. Each node has a separate vascular and nervous supply, and lymphatic vascular interactions may occur within the node itself.

LYMPHNODES:

Lymph nodes are small oval or reniform bodies 0.1-2.5 cms long lying in the course of the lymphatic vessels. Each has an indentation on one side, the hilum, through which blood vessels enter and leave and an efferent lymphatic vessel also emerges. Several afferent lymphatics enter peripherally. Lymph nodes have a highly cellular cortex and medulla contains poorly demarcated cavities. The cortex is deficient at the hilum where the medulla reaches the hilum. The efferent vessel emerges from the hilum while afferent vessels empty into cortex. Lymph nodes are particularly numerous in the neck.

LYMPH DRAINAGE OF HEAD AND NECK

With the outstanding exception of the Tongue, the lymph drainage if the head and neck tends to follow the general rule of superficial lymphatics accompanying venis and deep lymphatics accompanying arteries. All the lymph for the head and neck drains ultimately in to the deep cervical lymph nodes, a chain of lymph nodes surrounding the whole of the internal jugular Vein. Most of this lymph has already filtered through outlying nodes that are arranged in two circles, the inner circle and the outer circle. The outer is made up superficial nodes from chin to occiput. The inner circle lies within it, surrounding the upper air and alimentary passages, comprising the pretracheal and retropharyngeal nodes. With few exceptions, lymph from a node in either of theses circles drains into the nearest deep cervical nodes. The internal jugular veins, surrounded by deep cervical nodes, lie vertically between the inner and outer circles.

Lymph from deep cervical nodes is collected in to jugular lymph trunk. This joins the Thoracic duct on the left side, but on the right side usually opens independently in to the internal jugular or Brachiocephalic Vein.

THE OUTER CIRCLE OF SUPERFICIAL NODES:

- Sub mental
- Sub auricular
- Pre auricular

- Post auricular
- Facial
- Parotid
- Occipital
- Superior cervical
- Anterior cervical

Submental

3 or 4 small nodes lie beneath the chin. They drain the tissues opposite the premaxilla of the upper jaw i.e. tip of the tongue, lingual and labial gum opposite the incisor teeth and the same extent of lower lip. The drainage is bilateral. The sub mental nodes in to sub mandibular group, but a few efferents pass directly to the jugulo Omohyoid node (posterior Inferior group).

Sub Mandibular

Besides receiving lymph from the sub mental nodes, this group drains a wide area extending from the center of forehead, nose and nearby cheek, upper lip and anterior two thirds of tongue. Also from

- Upper teeth
- Most of the lower teeth
- Anterior half of nasal cavity
- Frontal, maxillary middle and anterior ethmoidal sinuses

The nodes lie beneath the deep fascia on the surface of sub mandibular salivary gland. Most of them drain into the jugulo omohyoid node; a few of the posterior nodes drain in to the jugulo digastric node.

Buccal and Mandibular Nodes

A small node often lies on Buccinator muscle, another at the anterior border of masseter. They drain part of the cheek and lower eyelid. Their efferents pass to the anterior superior group of deep cervical nodes.

Preauricular Nodes

They are situated in front of the tragus. They lie superficial to the parotid fascia. They drain the outer surface of pinna and side of the scalp. They drain to upper group of deep cervical nodes.

Parotid Nodes

These nodes are situated both in the substance of the parotid and deep to it i.e. between parotid and sidewall of the pharynx. The deep nodes drain

1. Nasopharynx
2. Back of the nose

The more superficial receive lymph from

1. The eyelids
2. Front of the scalp
3. External auditory meatus
4. Tympanic cavity
5. They drain in to upper deep cervical nodes.

Facial Nodes

Consist of superficial and deep groups

- Superficial group consists of
- Infraorbital
- Buccinator
- Supremandibular

Deep nodes lie around maxillary vessels in relation to external pterygoid muscle.

These drain

- The temporal fossa
- Infratemporal fossa
- Back of the nose
- Pharynx

Post-Auricular Nodes

Situated on the mastoid process behind the pinna. They drain the temporal region of scalp, back of the pinna and external auditory meatus.

Superficial External Nodes

Situated on the outer surface of the sternomastoid around the external jugular vein. They drain the parotid region and lower part of the ear.

Occipital Nodes

A few lie at the apex of the posterior triangle midway between the mastoid process and external occipital protuberance. These drain the back of the scalp and auricle. Their efferents pass to supraclavicular nodes.

Anterior Cervical Nodes

These lie near the midline of the neck, in front of the larynx and trachea. They consist of superficial and deep set of nodes. Superficial set lie in relation to the anterior jugular vein and drain the skin of the neck. Deep set consists of

Infrahyoid Nodes: these lie on the thyrohyoid membrane and drain the front of the larynx.

Pre Laryngeal Nodes: These are lie on the cricothyroid ligament and drain the larynx. These modes are the first to become enlarged in cancer of the larynx. These nodes also assist in the drainage of thyroid.

Pre Tracheal Nodes: these lie in relation to the inferior thyroid veins in front of trachea and drain the thyroid and trachea.

Efferents of the Circular Chain: the deep cervical chain receives all the lymph from the above group of nodes except facial & sub mental. The effernets from these two groups pass first to the sub mandibular group.

Vertical Chain of Deep Cervical Nodes: this consists of a large number of nodes lying in relation to carotid sheath. A few members of this group occupy on outlying position behind the pharynx and are called retro pharyngeal nodes. They drain the back of he nose & pharynix and the auditory tube.

The vertical chain of deep cervical nodes lie along side the pharynx, trachea and esophagus and extends from the base of the skull to the root of the neck, they are arbitrarily divided in to super deep cervical and infero deep cervical groups by the point of bifurcation of the common carotid. (or by omohyoid). They are in close relationship with the internal jugular vein.

Some of the nodes of inferior group project beyond the posterior border of the sternomastoid, in to posterior triangle of neck.

There are a few small nodes, which lie I the groove between the trachea and oesophagus alongside the recurrent laryngeal nerve. They are called the paratracheal nodes and assist in the drainage of the thyroid

Two of the deep cervical groups are named

- Jugulo digastric node (main node of tonsil)
- Jugulo omohyoid node

For convenience of description deep cervical nodes are classified as follows

ANTERO SUPERIOR CHAIN

This consists of the jugulodigastric node and the primary lymph node of the tongue they are most commonly affected by direct spread of tuberculosis from mucus membrane of nasopharynix.

Jugulo digastric node –lies below the posterior belly of the digastric between the angle of the mandible and the anterior border of sternomastoid. Principal lymph node of the tongue is situated at the bifurcation of common carotid i.e. just below the greater cornu of hyoid bone. Transmitted pulsations of the vessel is felt and seen over the node when enlarged. A swelling situated in the anterior border of the under surface of the sternomastoid is another indication of antero superior group of nodes. The mass may be adherent to the superficial layer of the deep fascia or to the common facial vein and internal jugular vein deeply.

POSTERO SUPERIOR CHAIN: This is situated under the posterior part of the sternomastoid muscle and behind the internal jugular vein. They receive afferents from

- Retro pharyngeal
- Parotid
- Posterior auricular
- Occipital

- Superficial vessels directly from the mucous membrane of nasopharynx, pharyngeal tonsil, Eustachian tube, middle ear and nasal fossa.

Lymphatics from adenoids pass directly to a group of nodes lying deep to stern mastoid muscle, below the tip of mastoid process on the rectus capitalis and lateralis muscle. Spinal accessory nerve is in intimate relation with these nodes soon after it has crossed the internal jugular vein.

ANTERO INFERIOR CHAIN: This lies on the outer side of the internal jugular vein on the scalenus anticus muscle in intimate relation with the phrenic nerve and the thoracic duct on the left and right lymphatic duct on right side. They receive afferents from antero superior group of nodes and directly form larynx, oesophagus, trachea and thyroid. Their efferents communicate directly with superior mediastinal lymph nodes.

POSTERIOR INFERIOR CHAIN: This lies behind the internal jugular vein on the levator anguli scapularis, scalenus medius and upper part of serratus magnus muscle in intimate relation with the branches of brachial plexus. Afferent vessels to this group from postero superior chain and from axillary nodes. Their efferents communicate with anterior group and mediastinal nodes.

RETROPHARYNGEAL NODES: They lie behind the upper part of pharynx in front of prevertebral fascia and rectus capitus major muscle. They receive afferent vessels from nasal fossa, nasopharynx and Eustachina tube. Their efferents pass to upper deep cervical nodes. When suppurating they form swellings on either side of midline, as seen from the mouth. The post-pharyngeal abscess resulting from caries of the cervical spine is usually median in position and behind the prevertebral facia. In either case an abscess may be of a size that it extends into the neck and present at the upper part of posterior border of stern mastoid.

SUPRASTERNAL NODES: These lie in the space of burns, just above the manubrium sterni. The term “VIRCHOW’S NODE” is applied to the inferior cervical node on the left side, when infiltrated by carcinoma secondary to primary growth in the abdomen, they lie in proximity to the junction of the internal jugular vein with the subclavian vein and felt just behind the lowest part of the sternomastoid muscle.

ETIOLOGY OF LYMPHADENOPATHY

CLASSIFICATION

A. INFLAMMATORY

- Acute lymphadenitis
- Chronic lymphadeitis
- Granulomatous lymphadenitis-Tuberculosis, Syphilis, Cat scratch disease, infectious mononucleosis, toxoplasmosis, histoplasmosis, sarcoidosis

B. NEOPLASTIC

Benign-almost nonexistent

MALIGNANT-PRIMARY MALIGNANCY: Lymphoma (Hodgkin's and Non Hodgkin's)

METASTATIC MALIGNANCY:

Skin – Melanoma, Squamous cell carcinoma

Nasopharynx – Nose, Sinus, Pharynx, Larynx

Mouth – Oral cavity, Tongue, Lips

Oesophagus

Thyroid

Infraclavicular-Lung, Bronchus, GI tract, Seminoma,

Breast, Cervix

Occult primary

C. LYMPHATIC LEUKAEMIA

D. AUTO IMMUNE DISORDERS

Juvenile rheumatoid arthritis

Other collagen disorders like SLE, PAIN and Scleroderma

Lymphadenopathy is a rather common finding in clinical practice. It can be primary or secondary manifestation of numerous disorders. More than two their have nonspecific causes or upper respiratory illnesses (viral or bacterial) and less than 1% have malignancy. In one – study researchers reported that 186 out of 220 patients (84%) referred for evaluation of lymphadenopathy had a benign disease. Of the 186benign lymphadenopathy patients 112 (63%) had a nonspecific or reactive etiology (nocausative agent found) and the remainder had a specific cause most commonly infectious monouncleoasis, toxoplasmosis or tuberculosis. Thus the vast majority of patients with lymphadenopathy will have a nonspecific etiology requiring few diagnostic tests.

REACTIVE DISORDERS OF LYMPHNODES: the lymphoreticular system is remarkably labile and quickly responds to the presence of the presence of infective agents of foreign material in the activation of an immune response.

There are two main patterns of immune response:

The cell mediated response-this involves the activity of T lymphocytes, which are either directly or indirectly cytotoxic

The humoral response –this involves the activation of B-lymphocytes, which transform into antibody secreting plasma cells; interaction of antibody with antigen leads to destruction of the antigen.

Following tissue damage, particularly infection, lymph nodes in the drainage area become particularly active and enlarged; this is termed reactive hyperplasia. This may involve one or more of the principal cellular constituents of the node, depending on the nature of the foreign material encountered:

In a predominantly humoral response, there is hyperplasia of the cortical follicles [mainly composed of B lymphocytes] with development of large B cell germinal centres [follicular hyperplasia]

In a predominantly cell mediated response, there is hyperplasia of the para cortical [para follicular] region of the node which is mainly occupied by T lymphocytes [para follicular or para cortical hyperplasia]

Certain stimuli evoke intense phagocytic activity leading to dilatation of sub capsular and medullary sinuses with increased numbers and activity of macrophages and phagocytic sinus lining cells [sinus hyperplasia].

Certain foreign agents stimulate characteristic patterns of reaction in lymphnodes, which allow a diagnosis of disease of disease to be made on lymph node biopsy e.g., multiple minute granulomas in toxoplasmosis. In addition, lymph nodes are classically involved by specific chronic granulomatous infections such as tuberculosis, sarcoidosis, crohn's disease and syphilis

Damage or inflammation of any tissue may excite a reactive response in the draining lymph nodes. The three basic patterns of response, follicular hyperplasia, Para cortical hyperplasia and sinus hyperplasia, may be seen separately or in combination according to the nature of stimulus.

AIDS: The human immunodeficiency virus type 1 (HIV-1) is a lymphotropic virus which gains access to cells by way of the CD4 surface protein normally found on T helpers cells as well as most monocytes and other macrophages. Infection with HIV- 1 is associated with several clinical and pathological syndromes. Some patients develop fever, weight loss, diarrhea and generalixed lymph node enlargement (lymphadenopathy) in which there is generalized follicular hyperplasia. In patients with full-blown immunodeficient state of AIDS, lymph nodes commonly show loss of follicles, lymphocyte depletion, vascular proliferation and fibrosis.

The main consequences of the immunodeficient state seen in AIDS are: opportunistic –Pneumocystis carinii pneumonia, cytomegalovirus infection,

toxoplasmosis, mycobacterial infections (tuberculous as well as atypical mycobacteria), mucocutaneous and other fungal infections, including Cryptococcus. Neoplasis-development of Kaposi's Sarcoma as well as Non-Hodgkin's lymphomas.

INFLAMMATORY OR HYPER PLASTIC DISEASES: Acute nonspecific lymphadenitis: rarely biopsied microscopically, the earliest change is sinus dialation resulting from increased flow of lymph, followed by accumulation of neutrophils, vascular dialation and edema of capsule. Suppurative lymphadenitis is a feature of staphylococcal infections, mesenrteric lymphadenitis. Necrotizing features may be seen in bubonic plague, anthrax, typhoid fever. The necrotizing lymphadenitis is most commonly seen in Asian countries. Patients are most commonly young women with a persistent, painless cervical lymphdenopathey of modest dimensions that may be accompanied by fever. Microscopically, affected nodes show focal, well circumscribed, para cortical necrotizing lesions. Plasma cells and neutrophils are very scanty. Plasmacytoid monocytes are often numerous.

The evolution is generally benign and self-limited. However differential diagnosis is malignant lymphoma with secondary necrosis.

CHRONIC NONSPECIFIC LYMPHADENITIS: The morphologic features merge with those of hyperplasia. The general features are follicular hyperplasia, prominence of post capillary venules, increased number of

immunoblasts, plasma cells and histiocytes and fibrosis. The capsule may appear inflamed and /or fibrotic, and the process may extend in to the immediate perinodal tissues. In some cases predominance in the number of eosinophils, foamy macrophages and /or mast cells may be seen.

TUBERCULOSIS: Lymph nodes involved by tuberculosis may become adherent to each other and form a large multinodular mass that can be confused clinically with metastatic carcinoma. The most common location of clinically apparent lymphadenopathy is the cervical region (scrofula) where a draining sinus that communicates with the skin (scrofuloderma) may form. Microscopically the appearance ranges from multiple small epitheloid granuloms reminiscent of sarcoidosis to huge caseous masses surrounded by Langhan's giant cells, epitheloid cells and lymphocytes. Demonstration of organisms by special stains or cultures is necessary to clinch the diagnosis.

ATYPICAL MYCOBACTERIOSIS: Atypical mycobacteria are a common cause of granulomatous lymphadenitis. A caseating granulomatous disease in a cervical lymph node of a child unaccompanied by pulmonary involvement is more likely to be caused by an atypical organism than by mycobacterium tuberculosis. The process typically involves the lateral nodes in the mid portion of the neck. Drainage may continue for months or years in the absence of specific therapy, and healing may result in scarring and contractures. Microscopically the host reaction may be indistinguishable from that of

tuberculosis, but often the granulomatous response is overshadowed by suppurative changes. Acid –fast stain and culture will prove the diagnosis.

Tuberculosis is a disease of great antiquity. Tuberculous lesions have been found in the vertebrae of Neolithic man in Europe and Egyptian mummies perhaps as early as 3700 B.C.

Robert Koch discovered the infectious agent, the tubercle bacillus, in 1882. the W.H.O. estimates that 1722 million people are infected with tubercle bacilli. In 1990 eight million new cases of tuberculosis occurred, 95% of them in the developing word.

Tuberculosis, like other infections, when introduced in to susceptible population takes the form of an epidemic wave. The peak was reached in European and American countries, but not yet in developing countries. Deterioration of public health services, socioeconomic conditions and impoverishment are the main factors for the prevalence. Increased number of patients harbour resistant tubercle bacilli. The largest numbers of new cases are in Asia. The problem is multiple when co infection with HIV exists.

The two main species recognized are mycobacterium tuberculosis and mycobacterium bovis. M. Tuberculosis has the ability to be dormant for many years, so called ‘parsister’.

Human tubercle bacilli are transmitted by inhalation of droplets coughed or sneezed in to air by a patient with lesions. Most infections are got by sustained exposure rather than casual contact.

Bovine tubercle bacilli are transmitted by milk from diseased cows and first produce intestinal or tonsillar lesions.

Tuberculosis flourishes whenever there is poverty, malnourishment and lack of medical care.

The tuberculosis has decreased in develop countries because of improvement in standard of living conditions and quality of life of the people.

AGE AND SEX: Infants and young children of both sexes have weak defences and are prone to suffer from tuberculosis. Vast majority of cases in developing countries occur between 15 and 59 years.

MALNUTRITION: There is good evidence that malnutrition reduces resistance.

TOXIC FACTORS: Tobacco smoking, high alcohol consumption, corticosteroid and immunosuppressive drugs also reduce body defences.

OTHER DISEASES: Infection with HIV, diabetes, leukaemia, measles and whooping cough, chronic malaria and worm infestation are less important factors.

POVERTY: Overcrowding significantly increases the risk of transmission of tubercle bacilli.

TUBERCULOUS CERVICAL LYMPHADENOPATHY: Tuberculous lymph node involvement in the neck is an inflammatory reaction, usually not resulting in any clinical evidence of tuberculosis of upper respiratory tract. Lumph node involvement is an extra pulmonary primary complex. Primary lesion is rarely identified and the condition may be blood borne.

Routes of entry of the organism in to cervical lymph node:

1. Cutaneous implantation and mucosal inoculation
2. Tuberculosis following dental ulcer with cervical lymphadenitis is reported in children. The scars disappear as the permanent teeth erupt. Bacilli are cultured in a few cases. In some cases cutaneous or mucosal inoculation can be identified.
3. Retrograde lymphatic spread, from hilar and mediastinal nodes infection spreading upwards in to lower cervical nodes have been reported: typically bilateral.

OROPHARYNGEAL PRIMARY COMPLEX: Trough the tonsils, adenoids, carious tooth, nasopharynx and middle ear where the primary focus may exist tuberculosis can affect cervical lymph nodes. Primary may difficult to demonstrate.

Adenoids: In lymph nodes of posterior triangle about 22% have adenoids as portal of entry. Scalp is an unlikely site of entry of tubercle bacilli. Some lymphatics from adenoids enter the posterior triangle directly.

Caries tooth : This is the second frequent route of entry (12%). Sub maxillary nodes are involved. Tubercle bacilli have been demonstrated in decayed root pulp of extracted tooth.

Tonsils : The tonsils are the important portal of entry for tubercle bacilli and are the commonest source of primary complex. Cervical lymphadenitis is the outward visible sign.

Tubercle bacilli reaching these nodes subsequently also reactivate the lymph node tuberculosis. Role of tonsillectomy in the treatment of cervical lymphadenitis is controversial. Primary complex is not in the tonsil in at least 50% of cases of cervical lymphadenitis.

PRIMARY PULMONARY WITH HAEMATOGENOUS SPREAD: Children under 15 years may have primary complex ad pulmonary tuberculosis with cervical lymphadenitis. Cervical lymphadenitis may be a local manifestation of generalized disease and organisms reaching cervical lymph nodes through blood stream.

MULTIPLE SIMULTANEOUS INFECTIONS: Multiple primary infections can occur when large infecting dose produces oropharyngeal,

cervical and pulmonary complexes simultaneously. Pulmonary disease can occur in children already having cervical lymphadenitis. Heavy primary infection causing cervical lymphadenitis can produce additional pulmonary or mesenteric disease.

TRANS PLACENTAL INFECTION: Jones and Campbell recorded a case of tuberculous mother delivering a baby at 34 weeks of gestation. Baby was not in contact with mother after delivery but fount montoux positive at 4^{th} week and cervical nodes showed evidence of tuberculosis on biopsy. The infection might have occurred via umbilical vein or amniotic fluid infection. If by inhalation, nasopharynx is infected then cervical nodes can ge5t involved.

BACTERIOLOGY: Disease form Mycobacteria has been documented in the bones or pre historic humans and animals. In the 18^{th} and 19^{th} centuries it was known as white plague, decimating the population of Europe.

According to WHO, tuberculosis kills 3 million people yearly in underdeveloped countries, Mycobacterium tuberculosis the cause of tuberculosis is one of the 54 recognized species of mycobacteria. Of these 14 are known to cause disease in human beings. A remarkable increase in infections caused by M. Avium complex during 1990 can also be attributed to AIDS patients.

Infection is spread from person to person by inhalation of airborne droplet nuclei 1 to 5 micrometre in diameter. They are not trapped by nasal turbinates or mucociliary membranes and may reach the alveolar walls to be taken up by alveolar macrophages.

The genus mycobacterium comprises the acid-fast bacilli, organisms that share the property of acid fastness, i.e resistance to decolorization by weak mineral acids after staining with one of the arylmethane dyes. The name mycobacterium (fungus like growing bacterium) is derived from the mould like appearance of M.tuberculosis when growing in liquid media. The pathogens of this genus include organisms responsible for human and bovine tuberculosis and for leprosy.

Organisms of M.tuberculosis complex are always pathogenic for man and their isolation from clinical sample implies infection. Person to person spread is common, especially with M.tuberculosis. infection with M.bovis, a well-recognized animal pathogen, can be acquired zoonotically, via infected cow's milk or from other animals such as deer.

MORPHOLOGY AND STAINING: Mycobacterium are complex unicellular organisms with a wide range of antigenic determinants. They are bacillary or coccobacillary and vary from 0.5 to 10 micrometres in length.

They are Gm +ve but many species stain poorly with this stain because of the characteristics of the cell wall, rich in diverse lipids.

CULTURAL CHARACTERS: Many Mycobacteria produce carotenoid pigments under appropriate conditions. Some organisms produce pigment in the dark (scotochromogens) and others only on exposure to light (photochromogens). This pigment production can be a useful guide to identifications.

MYCOBACTERIUM TUBERCULOSIS COMPLEX: Organisms of this group show classical 'cording' (bacilli lie parallel to each other) on Z N stained smears, usually as slightly curved bacilli, which clump together.

M.TUBERCULOSIS: M.Tunerculosis gives eugenic (rough tough and buff) growth on glycerol and pyruvate egg. It is an aerobe that grows only at 37 degree Celsius and is usually sensitive to standard antimycobacterial therapy.

M.BOVIS: Responsible for bovine tuberculosis but also pathogenic to humans. Growth is enhanced by sodium pyruvate in culture media, giving eugenic colonies rather than dysgenic (small smooth) colonies in glycerol egg. It is microaerophilic and resistant to pyrazinamide.

MYCOBACTERIUM AVIUM COMPLEX (MAC): The M.avium complex comprises a group of slow growing mycobacteria, which can cause pulmonary

disease in elderly patients and localized infection (notably cervical adenitis) in children.

The complex includes m.avium, M.intracellulare and M.scrofulaceum. They are deeply staining acid fast small coccobacilli, which may show beading although long bacilli occur in some stains. Growth on egg media is dysgenic and some strains may producer a yellow orange pigment.

Other slow growing mycobacteria are M, Kansasii, M.Malmonese, M.Ulcerans, M Xenopi, and M.Gordone.

The main atypical mycobacteria causing cervical lymphadenopathy are M. avium, m. intracellulare and M.scrofulaceum.

PATHOGENESIS: While the majority of inhaled bacilli are trapped in the upper airways a fraction reach the alveoli. There, activated macrophages ingest the bacilli. The virulence and number of bacilli is important in the pathogensis. If the bacilli multiply their growth quickly kills macrophage. No activated monocytes attracted to the site ingest the bacilli released from lysed macrophage.

Once specific immunity develops large numberof activated macrophages accumulate at the site of primary lesion and granulomatous lesions are found (Tubercles). These lesions contain lymphocytes and

activated macrophages such as epitheloid cells and giant cells. Initially tissue – damaging response destroys macrophages and produces early solid necrosis at the center of the tubercle.

Tuberculous lymphadenitis is a regular feature of the primary complex of tuberculosis. Lymph node tuberculosis is one of the commonest presentations of extra pulmonary tuberculosis. Widespread nodal disease may be seen in individuals with increased susceptibility to infections.

Before the stringent control of tuberculosis in the cattle and the universal pasteurization of milk the primary lesion was often in the tonsils (with cervical lymphadenitis) or in the gut (with mesenteric lymphadenitis). Most of the cases were of bovine strain infection.

The lymph node lesions are slowly evolving granulomas with necrosis at the center of the focal granulomas. The individual tubercles coalesce to form necrotic chessy material, but the process is halted before this and the granulomas become calcified.

The rapid spread of caseation and multiplication of.Tuberculosis in the nodes result in ulceration through the walls of adjacent blood vessels and spread of infection through blood stream leading to military tuberculosis. The development of caseation is linked with appearance of hypersensitivity to tubercular protein.

The stage of infection are seen clearly in the neck nodes. From the tonsillar portal of entry the infection spreads by the lymphatics to the nearest lymph node. When the disease spreads many lymph nodes are affected.

In the event the patient develop natural resistance, fibrosis and calcification of lymph nodes occur. In other circumstances the caseating material liquefies and breaks through the capsule of lymph node and a cold abscess forms. The pus is at first confined to deep cervical fascia. Within a few weeks the fascia is eroded at some point and the pus flows through this small opening in to the more accommodating space beneath the deep fascia. This is known as the collar stud abscess. Unless proper treatment is given at this stage the skin gets indurate, breaks down to form a sinus, which without treatment may remain for years. From each of these stages resolution may occur with calcification if caseation has occurred and with much scarring if sinuses have formed.

ATYPICAL OR OPPORTUNISTIC MYCOBACTERIAL INFECTIONS:

Nontuberculous mycobacteria involve the lymphatic system most commonly in the cervical nodes in the children between 1 and 5 years. Most of them are due to M. avium, M.intracellulare and M.scrofulaceum. the nodes are almost always unilateral and rarely any systemic symptoms. The site is usually submandibular or sub maxillary node progress to disseminated disease may

occur and may be fatal. Localized cervical nodes are best treated by total excision.

HIV ASSOCIATED TUBERCULOSIS: Tuberculosis is the most common opportunistic disease associated with AIDS in many developing countries. 90% have pulmonary disease. Of those who have extra pulmonary disease 85% have lymphadenopathy (mainly cervical). Also common is mediastinal lymphadenopathy. Sputum is often smear negative. Because of poor cellular immunity Tuberculin skin test is usually nonreactive. Tubercle bacilli may be obtained by blood culture.

M.avium, M. intracellulare infections are common in AIDS. Histologically affected tissues are infiltrated with foamy histiocytes with weakly basophilic cytoplasm.

CLINICAL FEATURES

Mostly young adults children are affected by cervical lymphadenopathy. It can occur at any age.

The human strain of M.tuberculosis is the cause of 70% of cases, and not the bovine strain as believed earlier.

In 80% of cases the pathology is confined to the clinically affected group of lymph nodes. There may be coexisting pulmonary or renal tuberculosis. Appropriate investigations are done in such cases. Mediastinal and mesenteric lymph nodes may be involved in a small percentage of patients. So also the axillary lymph nodes. In miller's series (1956) tuberculous cervical lymphadenitis was found to be a localized disease in 120 out of 160 children.

Patel (1960) studied 100 cases of cervical lymphadenitis out of which 60 were of tuberculous etiology.

Jones and Campbell have described the following stages of tuberculous cervical lymphadenopathy.

Stage I

Enlarged, firm, mobile, discrete, slightly tender nodes showing nonspecific reactive hyperplasia.

Stage II

Larger nodes, rubbery, fixed to surrounding tissue due to periadenitis. Histologically caseation present. Glands matted together.

Stage III Central abscess (cold absences) formation

Stage IV Collar stud abscess formation

Stage V Sinus formation

In stage I, nodes are mistaken for chronic nonspecific adenitis. Gland biopsy will clinch the diagnosis.

In Stage III, differential diagnosis include infected branchial cyst or thyroglossal cyst.“cold abscess” can be distinguished by the normal skin temperature and absence of inflammation.

Stage IV Collar stud abscess may present as

1. Orthodox type
2. Long stemmed type
3. Dumb bell type

Stage V if untreated collar stud abscess bursts open through the skin leading to sinus (scrofuloderma) discharging the necrotic material beneath the deep cervical fascia.

INVESTIGATIONS

A careful history with stress on contact with tuberculosis is important. Detailed clinical examination of the patient and the description of the group of lymph nodes are to be recorded.

Clinical features suggesting tuberculous lymphadenopathy include multiplicity, matting and caseation, but these parameters are not specific.

Blood: Hypochromic microytic anaemia may be present.

Hb percentage maybe decreased

WBC count may not be altered much

ESR increased. It is nonspecific. But it is a prognostic indicator.

Tuberculin testing:

In children a positive tuberculin test is taken as evidence of infection. It is mainly used for cantact tracing. It is rarely of any value in diagnosis of tuberculosis.

Patients are tested with purified protein derivative (PPD) of Mycobacterium tuberculosis or old tuberculin. The test based on cell mediated immunity with the development of in duration and inflammation at the site of infection due to infiltration with mainly T lymphoctes.

THE MANTOUX TEST

This is used for individual patients.

0.1ml of 1:1000 strength PPD equivalent to 10 tuberculin units is injected intradermally.

The induration is measured after 72 hours. This test is positive if the induration is 10mm or more in diameter.

CHEST X-RAY

If pulmonary lesion is present the radiological evidence of patchy or nodular shadows in the upper zones, loss of volume and fibrosis with or without cavitation or typical calcification may be present.

The mediastinal nodes enlargement can be detected by X ray chest. There may be evidence of pleural effusion.

SMEAR FOR ACID FAST BACILLUS:

A smear from a specimen of sputum, pus, discharge from sinus willdemonstrate the acid-fast bacilli if present. The stain used is zeihl-neelsen stain.

The tubercle bacilli resist decolorizing by both acid and alcohol. It will remain bright red while all other organisms take on the color of the counter

stain. The presence of acid-fast bacilli from cervical node abscess is variable. It may be demonstrable in countries where the prevalence is high.

CULTURE

It is the process of propagating organisms by providing the proper environmental conditions-nutrients, pH, temperature, aeration, salt, osmotic pressure of the medium and light for photosynthetic organisms. Lowenstein jensen medium is the most widely used for the culture of M.tuberculosis. visible growth is seen 2 weeks on primary isolation from clinical material. Colonies may take up to 8 weeks to appear. Colonies are buff colored and appear like dry breadcrums.

FNAC

It is the study of cells obtained by aspiration using fine needle under vacuum. The needle gauze of 21 to 22 is used. Minute quantity of tissue fluid is got. Greig and Cray first described it in 1904.

Microscopically presence of epitheloid cells, Langhan's giant cells along with caseating material are suggestive of tuberculosis. Definitive diagnosis is by staining is by staining or culture of the tubercle bacilli.

The advantages of FNAC are that it is a simple procedure done on Op basis. No anaesthesia is required. Safe, specific and reliable. Only

disadvantage is that the histologic interpretation depends on the experience of the histologist in the field.

BIOPSY:

Surgical excision of the affected lymph node is mandatory. Ideally it should be done under general anaesthesia. But excision of small superficial lymph node may be done under local anaesthesia.

Finding of histopathological examination of a tuberculous lymphnode consist of graunlomatous lesion with epitheloid and giant cells of langerhans with or without caseation. Action –fast bacilli may be demonstrated by zeihl Neelson technique. Coalescence of the tubercles may lead to central necrotic cheesy material but this process may halt much before and walled of y fibrosis and calcification.

A sound knowledge of anatomy is important while doing lymph node biopsy. Otherwise the spinal accessory nerve may be injured while removing lymph node from the posterior triandle of neck. Phrenic nerve may get injured while removing supraclavicular lymph node. Injury to transverse cervical veins and inferior cervical veins also must be recognized and managed in such caesbefore closure. The cut section of the node should be examined macroscopically before sending the specimen for histopathological examination.

ANIMAL INOCULATION:

Guinea pig inoculation is a sensitive method and may detect as few as 10 bacilli/ ml. But results are got only after several weeks because of the slow growth. Modern culture methods are very yielding that animal inoculation methods are rarely used.

DIFFERENTIAL DIAGNOSIS

1. Acute lymphadenitis
2. Chronic lymphadenitis
3. Syphilitic lymphadenitis
4. Cat scratch disease
5. Infectious mononucleosis (glandular fever)
6. Tularemia
7. Brucellosis
8. Sarcoidosis
9. Toxoplasmosis
10. Fungal diseases
11. Neoplasms
12. Hodgkins lymphoma
13. Secondary carcinoma

TREATMENT

CHEMOTHERAPY: Modern chemotherapy is so effective that proper drug regimens are prescribed and if the patient is wholly co operative in treatment than cure rate is 100% patients with initially drug sensitive tubercle bacilli and in majority of patients having drug resistant organisms. The concept of short-term chemotherapy is to select combinations of drugs that are rapidly sterilizing. Treatment with 3 or 4 drugs in the initial phage will almost always prevent the emergence of ‘persisters’

The short-term regimens have the advantage of reducing chronic toxicity, making patient compliance easier, making relapse highly unlikely.

DRUGS USED IN PREVIOUSLY UNTREATED PATIENTS

ISONIAZID (H)

RIFAMPICIN (R)

ETHAMBUTOL (E)

PYRAZINAMIDE (Z)

STREPTOMYCIN (S)

THIACETAZONE (T)

DRUGS USED IF PRIMARY TREATMENT FAILS

CYCLOSERINE (CYC)

ETHIONAMIDE (ETH)

PROTHIONAMIDE (PRO)

PARAAMINO SALICYLIC ACID (PAS)

CAPREOMYCIN (CAP)

VIOMYCIN (VIO)

KANAMYCIN (KAN)

ISONIAZID

It is a very powerful bactericidal drug; has very few side effects; it is very cheap. Highly effective concentrations are achieved in all tissues. There is no cross resistance with other drugs.

Adverse effects Rarely generalized skin rashes can occur. Peripheral neuropathy is the main adverse effect.

It can be treated by giving 100-200 mg pyridoxine daily or can be prevented by giving 10mg pyridoxine daily.

DOSAGE:

Tablets – Adults:300mg daily

Syrup – Children :10mg/kg daily

RIFAMPICIN

Highly effective concentrations are obtained in all tissues. No cross resistance with other drugs. Cost is higher. Taken ½ hour before breakfast. It colours the sweat, urine and tears orange. Mild flushing, itching of skin, rah can occur occasionally. Hepatitis is extremely uncommon unless patient has a history of liver disease or alcoholism.

DOSAGE

Capsules –Adults:450-600mg/daily

Children :10mg/kg daily

STREPTOMYCIN

Not absorbed by the intestine. So it is given by intra muscular injections. Diffuse readily into body tissues. Ethambutol can be substituted for streptomycin if giving injections daily is not practicable, only in adults. Damage to vestibular apparatus is manifested by giddiness, especially in old patients. Treatment must be stopped immediately. Anaphylaxis is occasionally seen. It should be avoided in pregnancy.

DOSAGE

Vials: Adults: 0.75-1gm daily

Children: 20mg/kg daily

Ethambutol

It is a bacteriostatic drug. It is mainly used to prevent the emergence of drug resistance to main bactericidal drugs (INH, Rifampicin, Streptomycin). Not given to young children who are unlikely to tell they are losing their sight. Also avoided in renal failure. The main adverse reaction is progressive loss of vision due to retro bulbar neuritis. Drug must be stopped in that case.

DOSAGE

Tablets: Adults:1.5-2.0 gm daily

Children: 35 mg/kg daily

THIACETAZONE:

It is very weak drug but valuable as a companion drug in preventing the development of isoniazid resistance. It should be used only in communities where it has been shown to be effective and to be of low toxicity. Adverse reactions are cutaneous rashes (often severe) and conjunctivits.

SECOND LINE DRUGS

These drugs are to be used in retreatment when there is resistance to the drugs used in standard treatment. The drugs are Ethionamide / Prothionamide, PAS, Cycloserine, Kanamycin and Capreomycin.

Drugs	Dosage	Side effects
Ethionamide / Prothionamide	0.75-1 gm daily	Metallic taste in mouth
PAS	10-12gm daily in 2 divided doses	Fever and rash
Cycloserine	250mg 2×daily up to 250mg 3×daily	Confusion, convulsion
Capreomycin Kanamycin, Viomycin	0.75-1gm daily	Vestibular toxicity Hypocalcaemia Hypomagnesemia

CHEMOTHERAPY FOR NEWLY DIAGNOSED PATIENTS

6 MONTHS REGIMEN – APPROVED BY WHO

Isoniazid (H) plus Rifampicin (R) plus Pyrzinamide (Z) for the two months, followed by isoniazid and Rifampicin for 4 months. The short hand form of this regimen is 2HRZ/4HR.

The recent development is the fixed dose combination of isoniazid, rifampicin and pyrazinamide. This simplifies the regimen. It is essential to ensure fixed drug combinations do not alter serum drug concentrations.

FOUR DRUG REGIMEN

In populations with a higher rate of initial drug resistance add a fourth drug for the first 2 months, either Streptomycin (S) or Ethambutol (E)

These regimens are written as 2SHRZ/4HR or 2EHRZ /4HR

It can also be used as a retreament regime (where a patient has missed more than 1 month of routine treatment)

These regimens are recommended for both pulmonary and non-pulmonary tuberculosis in both adults and children.

SUPERVISORY TREATMENT

If possible make sure that each dose is fully supervised for the first 2 months of treatment.

If possible make sure that each dose is fully supervised for the first 2 months of treatment.

EIGHT – MONTH REGIMEN

First 2 months

Isoniazid +Rifampicin +Pyrazinamide.

Add a fourth drug if high rate of initial drug resistance is prevalent. Next 6 months.

1. Isoniazid +Thiacetazone
2. If side effects to thiacetazone develop give Isoniazid +Ethambutol or Isoniazid alone to complete 8 months.

This regimen is also recommended by WHO, summarized as 2 HRZ/6HT

Or

EHRZ /6 HT.

INTERMITTENT OR PARTLY INTERMITTENT SHORT COURSE REGIMENS

Dose of drugs are different than daily short course chemotherapy.

Alternate regimens used are 2HRZ/4H3 R3

2HRZ/4H2 R2, 2E3 H3 R3 Z3

Or

2S3 H3 R3 Z3/ 4 H3 R3 (drugs given thrice weekly)

MANAGEMENT OF PATIENTS WITH DRUG RESISTANCE

It is very difficult and expensive

GENERAL PRINCIPLES

1. Obtain accurate chemotherapy history
2. Obtain information regarding resistance pattern, if possible
3. Reserve drugs are costly
4. Treatment failure is often due to noncompliance
5. Three or four r drugs are better than two

Factors that influence compliance include anxiety, alcohol, stigma of disease and ignorance.

Chemotherapy is very effective. If the patient is cooperative and proper regimens are given cure rates are 100%.

FAILURE OF CHEMOTHERAPY

It is due to several reasons.

Failure to use 2 drugs for which organisms are sensitive

Noncompliance by patients

Drug resistance

Coexisting tuberculosis with other diseases like lymphoma

TREATMENT OF CERVICAL LYMPHNOES OF ATYPICAL MYCOBACTERIAL CAUSE

Nontuberculous mycobacteria involve the lymphatic system most commonly in the cervical nodes in children between 1 and 5 years. The large majorities are due to MAIS complex but M.Kansasii may be responsible. The nodes are always unilateral and rarely any systemic manifestations are there. The site is usually submandibular or sub maxillary; very rarely the pre auricular, axillary or inguinal nodes may be affected. Lymph node involvement is now commonly seen in AIDS patients.

Both M. scrofulaceum and M.avium intracellulare show marked drug resistance to anti tubercular drugs. Hence antimycobacterial drugs are not helpful. However complete healing without recurrence is reported when treatment with clarithromycin as a monotherapy is used in children with cervical lymphadenitis caused by M.avium complex.

Total surgical excision of the involved lymph node is the treatment of choice. The advantages of surgical excision in the hands of experienced surgeons are high cure rate (95%) low complication rate and excellent cosmetic results.

If surgery cannot be performed or when complete excision is not possible, Rifampicin can be used as chemotherapy. Alternative nonexcisional approaches include needle aspiration, incision and drainage, incision and curettage.

SURGICAL TREATMENT

First line of treatment for tuberculous lymphadenitis is medical. Under chemotherapy with antituberculous drugs the glands gradually shrink. Occasionally the swellings become large with center fluctuant (cold abscess), then the capsule of lymphnode is broken involving the deep fascia forming collar stud abscess or involve skin forming discharging sinus. In such cases surgery is needed.

TREATMENT ABSCESS OF NECK

The incision and drainage is done; collar stud abscesses should be recognized. The drainage should be adequate and complete. Otherwise it will lead to persistent sinus.

OPERATION

Incision is made along the skin crease. Ideally anaesthesia should be used. Making skin and deep fascia incision will drain pus. Deeper extensions and granulations will be revealed. These should be explored ad curetted out. The pus should be sent for microscopy, culture and sensitivity for pyogenic bacteria and acid fast bacilli. Histological examination of lymphnode is useful. When the report comes as tuberculous lymphadenitis antituberculous chemotherapy is started. The drainage wound is lightly approximated around a soft rubber tube with few stitches. Drain is removed after 24-48 hours.

EXCISION OF LYMPHNODE

INDICATIONS

- When no response to chemotherapy
- Persisting sinus

An oblique incision gives good access. If nodes are related to internal jugular vein, it should be safeguarded. If nodes are large and matted they will be adherent and removal is difficult. One may injure the vein causing bleeding. If injured the segment of the vein can be dissected after ligating both above and below the lymphnode mass.

EXCISION OF SINUSES

The sinuses should be excised along with the underlying nodes. If the sinuses are not excised they may persist for many months or years. The sinuses should be excised early under cover of antibiotics and antituberculous drugs. Blunt and sharp dissections are used for excision of sinus and the lymphnodes.

In 50% of tuberculous lymphadenopathy the primary focus is in oropharynx. Even if the focus is in tonsil, it may appear normal. Tonsillectomy is not of much help and is not practiced.

Associated pulmonary tuberculosis is not a contraindication for surgical treatment of lymphnodes. Surgery helps medical treatment.

MATERIAL AND METHODS

The material for this study consists of patients attending the surgical OPD of Govt. Rajaji Hospital, Madurai. This study comprises of 50 cases studied during March 2002-March 2005.

In this series 50 cases were studied clinical history, Physical examination and investigations were done. After physical examination and arriving at clinical diagnosis, confirmation was done by special investigations. Lymphnode biopsy was the most important of these. Cases were taken at random and only cases who gave consent for lymph node biopsy were taken for study. Only inflammatory and infective cases were taken. Cases of other etiology were not included in this study. Name, Age, Sex, Religion Address, Occupation of the patients were noted. Patients were divided in to 3 income groups according to their monthly income.

1. Up to Rs. 2000 — Low income group
2. 2000-6000 — Middle income group
3. Above Rs. 6000 — Higher income group

In the history particular emphasis was given to the type of accommodation, the nutritional value of food, history of contact with tuberculosis, any consumption of raw milk. Also history of recurrent pharyngeal infection, scalp infection, ear infections were taken.

After clinical diagnosis was made investigations were done to confirm the diagnosis, Routine blood examination was done like Erythrocyte sedimentation rate (ESR), Total white cell count (TC), Differential count (DC) and haemoglobin percentage (Hb%) Montoux test was done. Chest X-ray was taken. Sputum examination was done.

FNAC was done in all cases.

Lymph node biopsy was done in all cases. Macroscopic appearance of the specimen noted down and sent for hostopathological examination.

After the confirmation of diagnosis, for tunerculous lymphadenopathy treatment with antituberculous chemotherapy ranging from 6 to 9 months was started, depending on the severity of the node involvement and the patient's response to chemotherapy.

The chemotherapy regimens used were as follows

Four drugs regimen was used. INH plus Rifampicin plus Ethambutol plus pyrazinamide were used for the first 2 months.

INH 300 mg daily

Rifampicin 450 mg daily

Ethambutol 800 mg daily

Pyrazinamide 1500 mg daily

Pyridoxine was supplemented with these drugs to prevent peripheral neuritis. In the continuation phase of 4 months only 2 drugs were given –INH and Rifampicin along with pyridoxine 10 mg daily

For those patients in whom glands persisted the continuation phase was for 7 more months i.e.9 months regimen.

Repeated aspirations were done on patients having cold abscess on weekly basis till pus stopped collecting. Excisions of discharging sinuses were done. All these were done while patient was put on anti tuberculous chemotherapy.

Along with this, advice was given to take nutritious food.

Most of the patients were followed up for a period of 6 to 9 months. A few patients were lost for follow up once the treatment was started. A few were being followed up for 3^{rd} or 4^{th} month at the time of preparing this dissertation.

ANALYSIS OF DATA

The total number of cases studied is 50. The patients were attending the surgicalout-patient departments of Govt. Rajaji Hospital, Madurai

Table - 1

AETIOLOGY OF CERVICAL LYMPHADENOPATHY

Aetiology	Studied series (50 cases)	
	No	**%**
Tuberculous lymphadenopathy	34	68
Nonspecific Lymphadenopathy	16	32
Sarcoidosis	-	-

From the above table it can be seen that tuberculous lymphadenopathy is the commonest cause of cervical lympadenopathy with 68% followed by chronic nonspecific lymphadenopathy with 32%. There was no case of sarcoidosis in this series.

INCIDENCE

AGE

The incidence of cervical lymphadenopathy in different age groups is shown in table - 2.

Age (in years)	Wilson series (100 cases)		P.B.Trivedi series (322 cases)		S.P.Pamra series (322 cases)		Study series (50 cases)	
	No	%	No	%	No	%	No	%
0-1	9`	9	25	10	55	17	3	6
11-20	25	25	101	44	82	25	19	38
21-30	32	32	83	35	109	35	18	36
31-40	13	13	18	8	37	11.45	2	4
41-50	9	9	8	3	24	7.45	4	8
51-60	2	2	-	-	15	4.65	4	8
>60	7	7	-	-	-	-	-	-

In this series of 50 cases the disease commonly affected the 2^{nd} and 3^{rd} decades with 19% and 18% respectively. Next common age group in which tuberculous lymphadenopathy presented is 5^{th} and 6^{th} decades. 4% of cases affected were in this group in the present study.

In wilson's series of 100 cases the common age group of patients was in the 2nd and 3rd decade followed by the 4th decade with 25%,32%,and 13% respectively.

In B.PTrivedi's series of 235 cases also the commonest age group of presentation was in the 2nd and 3rd decade with 44%, and 35%.Next common age groups affected were 1st and 4th decade with 10% and 8% respectively.

In S.P. Pamra series of 322 cases the commonest age group affected were 2nd and 3rd decades with 25% and 35%. Next common age group were the 1st and 4th decade with 17% and 11.45%.

In the preset study chronic nonspecific adenopathy affected most commonly the age group of 2nd and 3rd decades with 18% and 8% respectively.

In our country the tuberculous lymphadenopathy commonly affects the younger age group. Commonest age group affected is between 11 and 20,21and 30 closely followed by 31 and 40 years. Nonspecific lymphadenopathy commonly affects the age group of 11 to 20, 21 to 30 and less commonly o to 10.

But in western counties the pattern is different. Common age group affected is 0 to 10 years. The causative organism in this age group is atypical mycobacterium. In adults the causative agent is most commonly the mycobacterium tuberculosis only 5% are due to atypical mycobacterium.

In one study of 343 children with reported lymphadenitis due to atypical mycobacteria 136 were of 3 years or younger age. 194 were younger than 5 years. Only 5 children were younger than 1 year.

It cannot be assumed that all cervical lymphadenopathy is children are caused by atypical mycobacteria. About 5-10% of childhood lymphadenopathy are due to mycobacterium Tuberculosis.

In another series studied by Hooper, Tuberculous lymphadenopathy was most common in the age group of 20 to 40 years.

Table - 3

Age in years	**Prabhakar series (1973)**	**Present series**
Minimum	0.75 (9 moths)	1
Maximum	90	60
Average	33.6	30.5

In praphakar's series earliest presentation was in a 9 month old infant and late age of occurance was 90 years the average age being 33.6 years.

In the present series the minimum age of presentation was 1 year and the maximum age of presentation was 60 years. The average age of presentation was 30.5 years.

HISTORY OF CONTACT WITH TUBERCULOSIS

As shown in table 4 there was no definite history of contact with tuberculosis in 82% of cases. A definite history was obtained in only in 18% of cases.

Table - 4

HISTORY OF CONTACT WITH TUBERCULOSIS

	No history of contact	Definite history of contact	Total
Number	41	9	50
%	82	18	100

In S.K. Sen's series of tuberculous cervical lymphadenopathy of 386 cases 78.6 % cases had no history of contact with tuberculosis, 19.1% had definite history of contact with tuberculosis and a vague history of cantact with tuberculosis was obtained in 5.15 of cases.

Sex incidence

There is comparatively an increased incidence of tuberculous cervical lymphadenopathy in females than males.

Table – 5

	Male		Female		Total
	No	%	No	%	
Trivedi	113	43	122	57	235
Jones	51	42	71	58	122
S.K.Sen	16	41.44	226	58.6	386
S.D.Pamra	100	42.91	133	57.08	233
Study series	24	48	26	52	50

All the studies in the past as shown in the table 5 show a definite increased incidence of cervical lymphadenopathy in females. The incidence was more in Trivedi series 57% (1953), jone's series-58% (1983), S.K.Sen's series -58.6% (1955) and S.D.Pamra series -57.08%(1987).

In the present study though very small the sex incidence was as follows. Males 48% and females 52%

The increased incidence in females may be because of the wide prevalence of malnourishment in females. The other factors influencing the higher incidence in females are overcrowding lack of education, early marriage, pregnancy, large families, and poor socioeconomic conditions.

Incidence in different income groups

The economic status and living conditions were taken in to consideration to find out the incidence of cervical lymphadenopathy in the studies series.

Table - 6

Income group (Rupees per month)	**S.K.SEN (1955)**	**PRESENT SERIES**
LOW (<2000)	254 65.9%	22 44%
MIDDLE (2000-6000)	-	23 46%
HIGHER (>6000)	10 2.5%	5 10%

TABLE - 6A

LIVING CONDITINS	S.KSEN (1955)	PRESENT SERIES
OVERCROWDING (4 or more persons Living in one room)	296 (76.7%)	33 (66%)
Less than 4 persons living in one room	90 (23.3%)	17 (34%)

As shown in table 6, in this study series 44% of the patients belonged to the low income group, 46% belonged to the middle income group. Only 10% of patients belonged to the higher income group.

In S.K.Sen's series, 65.9% belonged to the low-income group and 31.6% belonged to the middle-income group. Only 2.5% were of the higher income group. Thus, economic status has an important role in the incidence of the disease. The majority of the patients belong to the lower economic status and lesser number of patients are in middle income group. The higher economic status groups is the least affected .

The table 6A shows living conditions of the patients. Here 66% of patients in this study lived in overcrowded conditions.i.e 4 or more than 4 persons lived in one room.

In S.K.Sen's series 76.7% lived in overcrowded conditions.

In the epidemiology of tuberculosis overcrowding is an important factor responsible for spread of the disease.

The other factors contributing to the higher incidence are population explosion. Lack of education, large families, poor housing, malnourishment, and unhygienic conditions of living.

The distribution of the disease pattern in urban andrural areas was studied in this series.

Table - 7

INCIDENCE OF CERVICAL LYMPHADENOPATHY IN URBAN AND RURAL AREAS

Etiology	Area	Number	%
Tuberculous	Urban	25	50
	Rural	9	18
Chronic nonspecific	Urban	15	30
	Rural	1	2

50% of the patients had tuberculous lymphadenopathy and belonged to urban area, 18% of the patients had tuberculosis and belonged to rural area. Chronic lymphadenopathy affected 30% patients and they belonged to urban area, 2% of the patients belonged to rural area.

Overcrowding is an important factor for the spread of tuberculosis and its higher incidence in urban areas.

Also, in urban areas the people of low socioeconomic group and slum dwellers are mostly affected.

Table - 8

PRESENTING SYMPTOMS OF THE STUDIED SERIES

Symptoms	Number of cases	%
Swelling in the neck	50	100
Axillary swelling	5	10
Inguinal swelling	5	10
Fever	15	30
Loss of weight	20	40
Loss of appetite	20	40
Sore throat	1	2
Cough	1	2
Discharging sinus	1	2
Cold abscess	4	8
Old sinus scars	1	2
Pain	3	6
Caries tooth	1	2

PRIMARY SYMPTOMS

As shown in table 8 all the 50 patients in the present study had cervical lymph node swelling.

The other common presenting symptoms were loss of weight and loss of appetite (40%), fever (30%), axillary and inguinal swellings (10%), cold abscess (8%), pain (6%) sore throat, cough discharging sinus, old sinus scars, caries tooth (2%).

Table - 9
GROUP OF LYMPHNODES INVOLVED

	No. of cases	%
Unilateral – right	16	32
Left	20	40
Bilateral	14	28
With other groups	5	10

As shown in the table 9 there was only unilateral involvement of node in 72% of cases. Right side was affected in 32% and left side was affected in 40% of cases. Bilateral involvement was seen in 14% of the cases. The lymphnodes were associated with other groups of lymphnodes in 10% of cases.

In S.K.Sen series there was bilateral neck node involvement in 54.5%, unilateral in 45.5% and neck nodes associated with other group of lymphnodes in 28.5% of cases.

Table - 10
VARIOUS GROUPS INVOLVED IN CERVICAL LYMPHADENOPATHY

Groups	Bailey	Ian aird	Wilmont	Present study
Submandibular & Submental	12 %	10%	15%	16%
Upper anterior Deep cervical	54%	70%	60%	28%
Upper posterior Deep cervical	22%	10%	13%	40%
Lower anterior deep cervical	-	5%	2%	28%
Lower posterior Deep cervical	4%	5%	9%	24%

It is evident from the table 10 that the upper anterior deep cervical group of nodes are the most commonly involved in Bailey (1965), I am Aird (1958) and wilmont series. jugulodigatric nodes were the commonest in this group because tonsils are the common route of entry for the tuberculous bacilli.

In the present series upper posterior deep cervical nodes were the commonest (40%) affected followed by upper anterior and lower anterior deep cervical groups (28%).

Table - 11
CHEST RADIOGRAPHY FINDINGS

FINDINGS	FABER (1974)	S.D.PUROHIT (1987)	PRESENT STUDY
Normal	40 (80%)	276 (67%)	42 (84%)
Evidence of Active tuberculosis	10 (20%)	133 (33%)	8 (16%)

Generalized tuberculosis is very common and may or may not be associated with a known focus in the body. It is characterized by simultaneous enlargement of all the palpable lymphnodes.

In Faber's series 20% had associated active lesion on chest x-ray in S.D.Purohit's series 33% or patients had associated active pulmonary tuberculosis as shown by chest x-ray. In the present series 16% has associated pulmonary tuberculosis as shown by chest x-ray.

The incidence of coexisting tuberculosis in other parts of body is low as shown in table 12. The highest incidence was found in faber's series (20%), lowest in wilmont's series (5%). In the present study the incidence was 16%.

PRIMARY OR SECONDARY ?

Whether the origin of tuberculous lymphadenopathy is a part of primary complex or haematogenous lesion still remains uncertain. The insidious onset and the absence of constitutional symptoms favour the opinion that the lesion is of primary haematogenous origin. The commonest striking feature reported by all was the unsidious onset. In the present study 68% of cases were of insidious onset.

The disease is mainly confined to the cervical group of lymph nodes. Incidence of associated active lesions is other parts of the body was found to be very low.

When the primary complex occurs in the lungs, the disease may also be generalized with lesions elsewhere in the body. The behaviour of these nodes closely resembles that of the peripheral adenitis following infection or injury at the drainage site.

TABLE - 12
INCIDENCE OF COEXISTING ACTIVE TUBERCULOUS LESIONS

Author	Year	No of cases	No of cases with coexisting active tuberculous lesions
Jones	1951	51	6 (11.8%)
S.K.SEN	1955	386	30 (7.7%)
WILMONT	1957	81	4 (5%)
FABER	1973	40	11 (20%)
Present Series	2001	50	8 (16%)

INVESTIGATIONS

The diagnosis of cervical lymphadenopathy was made clinically and the tuberculous etiology was confirmed after lymph node biopsy and histopathological examination. Various investigations done are as follows.

Blood

Blood examination was done in all cases. 78% of cases showed low haemoglobin percentage. The white blood cell count was normal in most of the cases. Some patients had lumphocytosis. Erythrocyste sedimentation rate was raised in 60% of cases. Though ESR is a nonspecific investigation and not diagnostic, it is useful as a prognostic indicator, while monitoring the patient with anti tubercular chemotherapy.

GRAM'S STAINING SPECIAL STAINNG & CULTURE

Gram's staining was done in cases of aspirated material from cold abscesses. Zeihl Neelson staining was also done. Culture of the aspirate was also done in such cases.

Sputum for A F B staining was done in all cases and culture in a few cases. 2% of cases were found to be sputum positive for AFB

MANTOUX REACTION

The positive mantoux reaction can not be taken as pathognomonic because almost all in our country would have been exposed to subclinical infection of tubercle bacilli. And may be positive for tuberculin test. But a negative montoux test will rule out the possibility of tuberculosis in cervical lymphadenoipathy. In the present series 68% of cases were positive for montoux test. It is still possible for a patient with tuberculous cervical lymphadenopathy proved by histopathology to have negative montoux reaction.

CHEST X-RAY

Chest X-ray was done in all cases to know if there was pulmonary tuberculosis. Evidence of pulmonary tuberculosis was found in only 16% cases.

BIOPSY

It is the confirmatory diagnostic aid. It was done in all the cases. Only histologically proved cases of tuberculous lymphadenopathy and chronic nonspecific lymphadenopathy were included in the present study. No case of sarcoidosis was reported in this study.

In the present series 56% were caseatig lymphadenitis, 12% were noncaseating lymphadenitis and 32% were nonspecific lymphadenitis.

Antitubercular treatment was started in all patients with proven tuberculous lymphadenopathy. Limited excisional surgery was done in 2 patients who had sinuses. Aspiration was done in 4 patients who had cold abscesses, under cover of antitubercular chemotherapy. All cases were followed up for 6 to 9 months after starting chemotherapy. Surgery was mainly for diagnostic purpose (biopsy); as regular aspiration of the cold abscesses; as limited excision and curettage of the sinuses.

Follow up

All the cases of tuberculous cervical lymphadenopathy were advised to take the antitubercular drugs regularly for 6 to 9 months. Advised to come for regular monthly follow up. Most of the patients responded well for chemotherapy. A few patients were lost for follow up.

PROGRESS

The prognosis was very good when the patients took regular treatment with antitubercular drugs for the recommended duration of therapy. If the disease is not diagnosed and treated or if there is no patient compliance, prolonged invalidation, dissemination of the disease, complications like cold abscess, sinus formation can occur. Disseminated tuberculosis may cause death eventually. Tubercular cervical lymphadenopathy is very common in our country particularly in people of low socioeconomic group.

RESULTS

In the present study most of the patients responded well to short course chemotherapy with 4 drugs. A few were lost for follow up. Surgery was limited in patients with cold abscesses and sinuses along with antitubercualr chemotherapy.

SUMMARY

A total number of 50 cases of tuberculous and nonspecific cervical lymphadenopathy was studied in this series. The cases were selected from the surgical OPD of Govt. Rajaji Hospital, Madurai during March 2002 to March 2005.

Table 13

AETIOLOGY OF CERVICAL LYMPHADENOPATHY

Aetiology	Studied series (50 cases)	
	No	%
Tuberculous lymphadenopathy	34	68
Nonspecific lymphadenopathy	16	32
Sarcoidosis	-	-

As shown in the table 13, tuberculous cervical lymphadenopathy was the commonest condition affecting the cervical lymphnodes with 68% followed by chronic nonspecific cervical lymphadenopathy with 32%. No case of sarcoidosis was reported in the present series.

CONCLUSIONS

I have studied 50 cases of cervical lymphadenopathy of inflammatory and infective etiology from the Govt. Rajaji Hospital, Madurai.

In this series the commonest cause of cervical lymphadenopathy is tuberculosis (68%) and the next common cause is chronic nonspecific lymphadenopathy (32%).

The commonest age group affected in this series are 2^{nd} and 3^{rd} decades. Sex incidence: in the present series females are found to be affected more than males. Females (52%); Males (48%).

A definite history of contact with tuberculosis was obtained in only 18% in this series.

44% of patients in this series were from low income group and 66% lived in overcrowded conditions thus proving that tuberculosis is very common in the low socioeconomic group. Overcrowding is an important factor for the prevalence of the disease.

In this series tuberculous lymphadenopathy was found more in the urban population (24%) than in rural population (9%), probably because of the overcrowded living conditions and atmospheric pollution.

Tuberculous cervical lymphadenopathy is commonly presented as swellings in the neck; other symptoms like fever, loss of weight, loss of appetite and cough are found less commonly in the present study.

There was no case of sarcoidosis seen in this series. There were only 16% of patients with associated pulmonary tuberculosis as shown by chest-x ray evidence in the present series.

After confirming the diagnosis as tuberculosis, short course chemotherapy with 4 drugs were given to the patient for 6-9 months in this series. The patients were followed for 6-9 months on monthly basis. Patients showed good response to chemotherapy as evidenced by regression in size of the cervical lymphnodes, improvement in appetite, increase in weight and general health of the patients.

Patients with chronic nonspecific cervical lymphadenopathy showed good results for a course of antibiotics (amoxicillin + Cloxacillin or Ciprofloxacin) usually 2-3 weeks.

A few patients with cold abscesses responded well for weekly aspirations with wide bore needle and antitubercular chemotherapy.

A few patients with cold abscesses responded well for weekly aspirations with wide bore needle and antitubercular chemotherapy. Along with antitubercular chemotherapy surgery in the form of excision and curettage for sinuses and persistent lymphnodes was performed.

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PROFORMA

SUBJECT : TB CERVICAL LYPHADENOPATHY

SERIAL NO	OP/NO:	DATE
NAME	AGE	SEX :M/F
ADDRESS	OCCUPATION	INCOME
	RELIGION	

COMPLAINTS AND DURATION

1. SWELLING IN THE NECK/OTHER REGIONS:
2. PAIN
3. FEVER
4. SINUS
5. DISCHARGE FROM THE SINUS
6. PRIMARY FOCUS IN THE DRAINAGE AREA

   EAR NOSE THROAT SCALP
7. LOSS OF APETITE AND WEIGHT
8. PRESSURE EFFECTS : SWELLING OF FACE AND NECK
   LOWER LIMB EDEMA
   DYSPNOEA
   DYSPHAGIA

PAST HISTORY

SIMILAR COMPLAINTS

TUNER CULOSIS

ENT/SCALP INFECTIONS

ANY OTHER DISEASES

TREATMENT

FAMILY HISTORY

TUBER CULOSIS

ANY OTHER DISEASES

PERSONAL HISTORY

LIVING GONDITIONS

SMOKING

ALCOHOL

DIET

BOWEL

BLADDER

MENSTRUAL HISTORY

REGULAR/ IRREGULAR DAYS CYCLE DAYS FLOW

MENARCHY MENOPAUSE

GENERAL EXAMINATION

BUILT –GOOD /MODERATE/ POOR

NOURISHMENT - GOOD /MODERATE/MALNOURISHED /CACHEXIA

PALLOR EDEMA NAIL CLUBBING

CYANOSIS ICTERUS LYMPHADENOPATHY–CERVICAL

AXILLARY EPITROCHLEAR INGUINAL

PULSE : BB TEMPERATURE RR:

LOCAL EXAMINATION OF NECK/ CERVICAL LYMPHNODES:

SITE	NUMBER	SIZE
SHAPE	SURFACE	EDGE
DISCRETE/MATTED	TEMPERATURE	TENDERNESS
CONSISTENCY	SKIN (OVERLYING)	FIXITY

PRESSURE EFFECTS

DRAINAGE AREA:

HEAD

FACE

MOUTH

PHARYNX

NECK

EAR

UPPER LIMB

BREAST

CHEST

ABDOMEN

TESTIS

OTHER LYMPH NODES:

AXILLARY

EPITROCHLEAR

INGUINAL

MEDIASTINAL

ABDOMEN:

SPLEEN

LIVER

MESENTERIC LYMPHNODES

ILIAC LYMPHNODES

PAROTID AND LACRIMAL GLANDS:

OTHER SYSTEMS: RESPIRATORY

CARDIOVASCULAR

SKELETAL

NERVOUS

PROVISIONAL DIAGNOSIS

INVESTIGATIONS : 1. BLOOD : HB% TC DC
ESR VDRL

2. FNAC
3. MANTOUX TEST
4. BIOPSY
5. CHEST X-RAY
6. CULTURE SENSITIVITY OF ASPIRATE
7. SPUTUM AFB AND CULTURE

CLINICAL DIAGNOSIS:

TREATMENT : GENERAL SUPPORTIVE

CHEMOTHERAPY

SURGERY

PROGRESS/FOLLOWUP

RESULTS/COMMENTS